

Parallel Domain Decomposition Methods in Fluid Models with Monte Carlo Transport

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Extended Abstract

Parallel domain decomposition for Monte Carlo methods is not well understood. The conventional wisdom on transport problems has been to copy the entire computational mesh to each processor of a massively parallel processor and to divide the simulated particles over the processors. This method will soon fail. In some cases, the mesh will not fit in a single processor's memory. In others, the Monte Carlo method may be one of several physics modules simulating different, coupled processes in the same problem.

We have developed a code that simulates a Monte Carlo method running on a massively parallel processor. The code provides a testbed for studying load balancing performance of several domain decomposition algorithms on model problem configurations as well as pathological cases. The results of these experiments will be presented.

The results of the above experiments will be applied to a parallel laser-tissue interaction simulation on the Cray T3D where Monte Carlo is used to compute the radiation transport and finite elements are used for hydrodynamics and heat conduction.

*This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.